United States Patent [19]

Foster

[11] **3,913,189**

[45] **Oct. 21, 1975**

[54] **FELTING NEEDLE WITH BARB ON A SINGLE EDGE AND AN ISOSCELES BLADE**

[76] Inventor: **Edson P. Foster,** 409 S. 29th St., Manitowoc, Wis. 54220

[22] Filed: **Jan. 6, 1975**

[21] Appl. No.: **538,649**

[52] **U.S. Cl.** ..... **28/4 N**

[51] **Int. Cl.²** **D04H 18/00**

[58] **Field of Search** ..... 28/4 R, 4 N, 72.2 R

[56] **References Cited**

UNITED STATES PATENTS

3,230,599	1/1966	McKew et al.	28/4 N
3,762,004	10/1973	Shepard et al.	28/4 N

FOREIGN PATENTS OR APPLICATIONS

233,141	3/1961	Australia	28/4 N
828,715	2/1960	United Kingdom	28/4 N
472,783	1/1972	Japan	28/4 N

Primary Examiner—Louis K. Rimrodt

Attorney, Agent, or Firm—Wheeler, Morsell, House & Fuller

[57] **ABSTRACT**

A felting needle having a needle body which in cross section is an isosceles triangle in which the equal sides are longer than the remaining side, or base, the altitude from the base to the most acute apex is about 20% greater than the base, and in which the apex angle between the equal sides is about 40° to 45°. The needle barbs are provided on that apex only.

9 Claims, 4 Drawing Figures

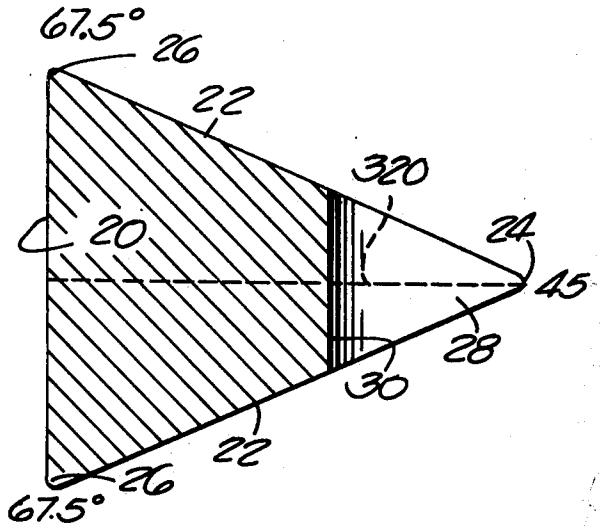


Fig. 1

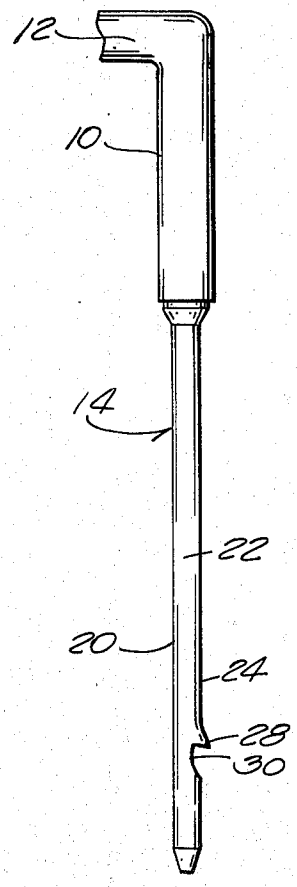
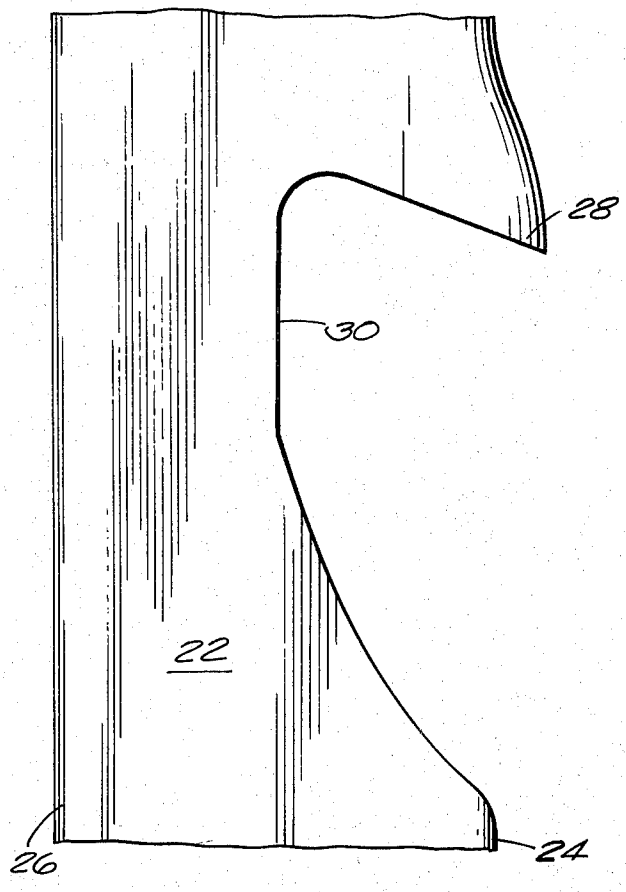


Fig. 2



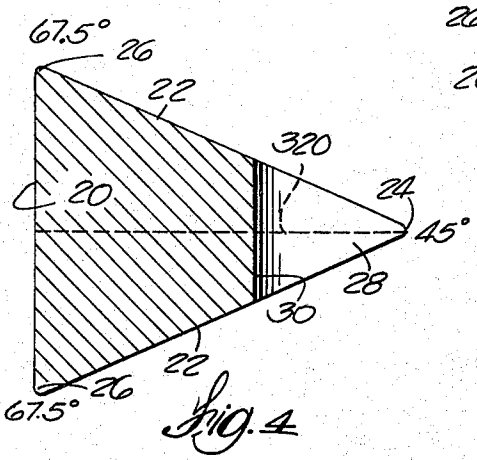


Fig. 4

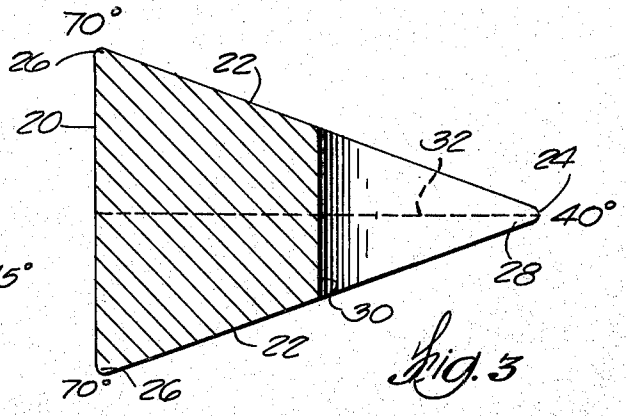


Fig. 3

FELTING NEEDLE WITH BARB ON A SINGLE EDGE AND AN ISOSCELES BLADE

BACKGROUND OF INVENTION

The present invention relates to improvements in felting needles. Needles having barbs in only a single plane are known, for instance, in Sitterson Canadian Pat. No. **732,806**; Zocher U.S. Pat. No. **3,464,097**; Foster U.S. Pat. No. **2,327,416**; and Foster U.S. Pat. No. **3,479,708.** So far as is known only the Sitterson patent discloses a cross-sectional shape which may be described as an isosceles triangle (FIG. **2**), and that disclosure appears accidental since FIG. **2** is described as a conventional triangular needle, which would be equilateral, and since the deviation from such a triangle is small. The Sitterson needle shows barbs at all three edges, without recognition that his assymetrical edges are unsuitable for barbing. His disclosure shows major deviations from standard barbs in FIG. **2**, and is not described in the text of the Sitterson patent.

No known prior art describes a needle having the strength and depth of throat of the needle of my invention.

It is common practice in art today to provide felting needles for special purposes with a barb or barbs in only one longitudinally extending edge of a conventional equilateral triangular blade.

This has the disadvantage that the barb throat capacity and barb size are limited by the limited height of the altitude through the vertex of the **60°** edge into which the barb is formed.

An additional disadvantage in barbing only one edge of a triangular blade configuration suitable for the barbing of three edges, is that the strength through the two unbarbed edges is greatly increased while the one barbed edge where the stress of needling will be concentrated remains no stronger than before.

Accordingly, it is the object of the present invention to provide an improved blade for a felting needle of substantially isosceles triangular cross-sectional configuration having only one longitudinally extending ridge or apex of bilateral symmetry suitable for barb formation, and the cross-sectional altitude through the vertex of said ridge to the end wall opposite said ridge being oversize to provide adequate strength and barb carrying capacity and the end wall or base being correspondingly undersize in width, to compensate for the structural strength it will not need since it has no barbs.

DEFINITIONS

For ease of identification the following definitions apply herein. The cross section of the blade of the felting needle of my invention is an isosceles triangle having a pair of equal sides and a narrower side. The narrow side will be called the "base" and the equal sides will be called "sides". The angles at which the sides meet the base will be called "corners", while the angle at which the sides meet each other will be called the "apex" or "ridge." Both the corners and the ridge extend substantially the length of the blade, or working portion of the needle. The isosceles triangle defined has its greatest altitude from the base to the apex, or ridge, and the unqualified word "altitude" refers to that, while the terms "major altitude" and "minor altitude" will be used to distinguish between the base-apex altitude and shorter altitudes, respectively. The "throat depth" is the measurement from the apex to the bottom

of the throat; "kickup" or "projection" is the height from apex to the tip of the barb. "Total barb depth" includes both throat depth and projection. A "nominal" measurement is taken to the sharp apex or corner of a theoretical triangle, as distinguished from actual measurements taken on real blades having slightly rounded apexes and corners.

SUMMARY OF THE INVENTION

My invention consists of a felting needle in which the body or blade of the needle is an isosceles triangle and in which felting barbs are provided only in the most acute apex. Like the prior art referred to, these needles will engage only fibers in a single orientation from the needle. However, my blade has a strongly isosceles cross-sectional form in which the most acute or narrowest apex is only approximately **40°** to **45°**, leading to a needle in which the altitude from the short base to the narrow apex is greater than about **120%** of the width of the narrow base. When the apex is **45°** the nominal altitude is **120%** of the nominal base; at smaller apex angles such as **40°** the actual altitude will also be **120%** of the actual base. Another way of defining my invention is that the equal sides of the isosceles triangle converge at an angle no greater than about **45°.**

When the barb and throat are formed into the apex of the defined narrow isosceles triangle formed by the converging equal sides, a number of substantial advantages are present which would not be present in other configurations of triangular bodies or blades on a felting needle. On a felting needle blade or body, the provision of barbs in a single apex of the blade substantially asymmetrically weakens the blade. In my isosceles cross-section blade, the altitude from the base or short side to the most acute angle or apex is sufficient so that in forming the barb and the throat the body or blade of the needle is not substantially weakened, because the barb is primarily in the narrowest portion while the remaining portion of the body where the major part of the material lies is not notched. In addition, the barbs and throats are more readily formed as they should be, because they are formed only in that portion of the blade which has bilateral symmetry. Were the barbs to be formed in the corners where the short side joins the longer sides the forming would have to be done with the needle resting on one of the longer sides, presenting the apex asymmetrically to the forming die. The resulting barbs and throats would not have the proper symmetrical configuration. Still another advantage of my invention is the fact that in the narrow blade less material is pushed out at the sides of the blade in forming the throat, giving a smoother configuration to the needle blade or body. Finally, the barb height attainable using the blade shape of my invention is much greater and the throat may be made much deeper for greater capacity than can be produced on a conventional blade, without weakening the blade unduly.

DESCRIPTION OF DRAWINGS

FIG. **1** is a side view of a felting needle.

FIG. **2** is a greatly enlarged side view of the throat and barb portion of the needle.

FIG. **3** is a cross-sectional view on line **3—3** of FIG. **2** showing the isosceles cross section of the blade according to my invention.

FIG. **4** is a view like FIG. **3** except that the cross-sectional shape of the blade is modified.

DETAILED DESCRIPTION OF THE EMBODIMENT SECTION

Although the disclosure hereof is detailed and exact to enable those skilled in the art to practice the invention, the physical embodiments herein disclosed merely exemplify the invention which may be embodied in other specific structure. While the best known embodiment has been described, the details may be changed without departing from the invention, which is defined by the claims.

My felting needle consists of a shank portion **10** having a crank **12** whereby the needle is secured in a fixture such as a needle board, a number of such needles being contained in a given fixture. The needle is provided with a blade portion **14** and with a somewhat rounded or pointed tip **16.**

As best shown in FIG. **3,** the blade or body **14** has the form of an isosceles triangle in cross-sectional area. The blade **14** has a short base **20** and a pair of sides **22** of equal length joining base **20** with apex **24.** Two additional corners **26** join the base **20** to the sides **22.** Although the apex and corners will be discussed as though they were true angles, in practice, they are slightly rounded. The amount of rounding may vary according to manufacturing practices.

In a manner which is well known to the art, one or more barbs **28** having throat **30** are formed in apex or ridge **24** only of blade **14,** preferably by resting the base **20** of the blade on a surface and striking the apex **24** with a die in conventional fashion.

When forming such a barb **28** on an equilateral triangular blade, it is rarely possible to form a throat which is more than **30%** of the altitude of the original blade to the apex in which the throat and barb are being formed. In my isosceles blade **14,** in which the sides **22** of the apex **24** being formed include an angle of approximately **40°** to **45°,** the apex being formed contains less material and offers less resistance to the forming die. Accordingly, it is possible to form approximately **40%** of the original altitude, giving greater throat depth.

For example, in a blade formed from **0.032** inch wire, for a **25** gauge needle, having (in nominal dimensions) an apex of **45°** where the barb **28** is to be formed, and **67.5°** corners, the nominal altitude of the blade is approximately .044 inches, the nominal base .0365 inches, and the throat may be struck to a depth of .0176 inches below the apex to give a total barb depth of .022 inches including the kickup of the barb above the apex or ridge (FIG. **2**) by the die. Had the blade been an equilateral triangle with a **60°** apex it would rarely be possible to form a throat having a depth more than **30%** of the original smaller altitude because of the rapid increase of the width of the blade as the die enters the apex. Therefore the barb and throat would be much smaller and less effective for felting. For instance, in a **60°** equilateral blade formed from the same wire size (in the illustration .032 inches diameter for a **25** gauge needle) the total area of the blade would be the same, but in theoretical dimensions the base would be about .0426 inches, the altitude would be about .0375 inches, and the barb depth can be little more than about .012 inches in total depth from the bottom of the throat to the top of the barb. The total barb depth of .022 inches inches in my isosceles blade has far greater capacity.

Because in my isosceles blade the major part of the material is near the base, such a deep barb does not unduly weaken the blade. This is particularly true since barbs are provided only on the single most acute apex.

The deep throat gives much greater throat capacity and hence, improves felting efficiency. I have found that these advantages are attained primarily when the angle of the apex in which the barbs are formed is between **40°** and **45°.** To put the matter another way, the nominal altitude should be not substantially less than **120%** of the width of the nominal base of the isosceles triangle. In preferred form the actual altitude is at least **120%** of the actual base. Within the range the proportions of the blade are such as to give rise to the advantages described.

FIG. **4** shows the broadest base compatible with this invention. The apex is **45°** and the base corners are **67.5°.** In such a triangle the altitude is **20%** larger than the base if the measurements are made on a nominal basis. However the invention also includes cases in which real measurements to rounded corners show the altitude to be **120%** of the base. In FIG. **4** the reference characters correspond to those above except that the altitude is labelled **320** to indicate that it is proportionally as short as permitted by my invention. The throat depth is shown as shallower, to indicate that a range of throat depths is permissible, though the capability for very great throat depths and total barb heights is an important aspect of the invention.

I claim:

1. A felting needle blade portion of substantially isosceles triangular cross-sectional configuration, comprising only one longitudinally extending ridge formed by bilaterally symmetrical major side walls converging laterally at an apex and being interconnected at their edges by the base of said triangular blade portion, the major altitude of said triangle being at least **20%** greater than said base, and a throat and barb formed only in said longitudinally extending ridge of said major altitude.

2. The device of claim **1** in which the throat extends to a depth of at least **30%** of the altitude of the triangle.

3. The device of claim **1** in which the dimensions are nominal dimensions.

4. The device of claim **1** in which the dimensions are actual dimensions.

5. The device of claim **1** in which the distance from the tip of the barb to the bottom of the throat is substantially one-half of the altitude of the triangle from the apex to the base.

6. In a felting needle, a blade having an isosceles triangular cross section, the base of said isosceles triangle being shorter than the sides, at least one felting barb and associated throat being formed at the apex of said triangle, the apex of said triangle being not greater than **45°.**

7. The device of claim **6** in which the nominal altitude of said triangle is not less than about **120%** of said width of the base of the triangle.

8. The device of claim **6** in which said apex in which the barbs are formed forms an angle in the range **40°** to **45°.**

9. The device of claim **6** in which the throat is at least **40%** as deep as the altitude of said triangle.

* * * * *